Space Weather Forecast

Issued on Monday 16 December 2024 at 01:29 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated Minor/Moderate (R1/R2) Radio Blackouts likely at times.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity has increased to Moderate levels following a Moderate intensity flare at 15/2024 UTC from AR3920. There are currently seven sunspot regions on the Earth-facing disc. Most complex of these is in the far southwest disc, with occasional Common-class flaring observed. The region is approaching the western horizon and so increasingly difficult to analyse in available imagery. Growth was observed in the largest region on the disc, located in the southwest, with proliferation of minor spots in its trailing portion. A sunspot group in the northwest decreased in overall size, but developed some small, mixed polarity spots in its leading region. Other regions on the disc were largely unchanged in appearance, although a new, small region emerged in the far southwest.

A filament (arc of the Sun's material) lift-off was observed around 15/0400 UTC in the southwest disc. A faint 'partial halo' Coronal Mass Ejection (CME) was faintly evident in solar imagery. This CME is awaiting modelling, but there is likely an Earth-directed component from this feature.

Solar Wind / Geomagnetic Activity: Solar winds indicated the onset of a fast-wind from an anticipated coronal hole. Solar wind speeds increased from background levels to become slightly elevated from around 15/0800 UTC, thereafter varying largely between 400-450km/s. The Interplanetary Magnetic Field (IMF), Bt, was moderate at first, before becoming weak between 15/1300-2100 UTC, after which it became moderate again. The north-south component, Bz, oscillated between positive and negative, but generally favoured a weakly negative direction, though became moderate at times. The net result of the above solar wind measures was for Quiet to Unsettled geomagnetic activity (Kp2-3).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate Solar activity is expected with Moderate flares considered likely on Days 1 and 4 (16 and 19 Dec) and with a chance of Moderate flares on Days 2 and 3 (17 and 18 Dec). There is a slight chance of isolated Strong flares throughout.

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Solar Wind / Geomagnetic Activity: At least one, perhaps two CMEs have the potential to arrive at Earth between Days 2 and 3 (17 and 18 Dec). A declining connection to the fast-wind of a coronal hole is expected to see solar wind speeds ease from slightly elevated to slow-ambient levels between Days 1 and 2 (16 and 17 Dec), with no further fast-wind enhancements expected during the period.

Geomagnetic activity is expected to be mainly Quiet to Unsettled, with a slight chance of isolated Active intervals between Days 1-3 (17-19 Dec). This forecast is likely to be updated in subsequent forecasts, especially for Days 2 and 3 (17 and 18 Dec) pending further analysis of recent CME activity.

Energetic Particles / Solar Radiation: There is a daily slight chance of S1/Minor solar radiation storms or greater, in response to any notable flares.

Geomagnetic Storms

Geomagnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	5	5	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	60	40	50	60
Very Active	R3-R5 (X Class)	No	10	5	5	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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